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## THE TREE PUZZLE AS A TEACHING DEVICE

J. M. HITCHINGS

Several years ago while teaching in the high school at Grinnell, Iowa, I found the "Grinnell Flora" and "Our Trees" by Prof. Conard very useful devices for teaching and particularly for motivating an interest in out door life.

After moving to Davenport, with only a forty-five minute class period, and an impossible walking distance from desirable spring flora, one choice for the out-of-door study was the trees.

Since students like field studies, and the trees demand to make themselves known in the spring, I set to work to construct a guide to the common native and cultivated trees of our locality. It was my desire to use leaf characteristics wherever possible and build a guide adaptable to high school students of the tenth grade. The use of technical terms was avoided wherever possible. If the appreciation of nature is our objective in the teaching of elementary biology, and I believe it should be the main objective, why confuse the student with terms that will discourage him?

The result of my effort is what I have chosen to call the "Tree Puzzle." The puzzle idea immediately attracts attention while the use of the term "key" means nothing to the student with little experience. The puzzle consists of a brief description as to how the game is to be used or played. A brief glossary of unavoidable terms was necessary along with a folding sheet of diagrams of leaves as to kinds, parts, shapes, margins, tips, edges, venation and the puzzling line of description comparable to the conventional "key."

I have purposely not included an index for I desired to have the student view the game of looking up trees as an interesting puzzle game, to be pursued to a satisfying end.

The puzzle lists the common names of the trees first and the scientific name below. I used to think it just as easy to learn the scientific name as the common one, but the average young high school student fails on this point, as scientific terms are meaningless to him and not at all within his range of experience.

If we, as high school teachers, are to teach nature appreciation in our biology classes, we must make the subject enjoyable, and within the range of accomplishment. The initial task should be

no more difficult than what can be easily and quickly grasped so as to make for satisfaction by accomplishment. One aim of the high school biology teacher should be to provide some situation of satisfaction through accomplishment for each student every day. After a love of the subject and a keen interest is developed then the student will usually be willing to work harder, in an effort to find out the unknown, for the feeling of accomplishment is desired and satisfies. It is indeed difficult to respond to each student every day in this way, but we can go a long way toward this end if we hold it as an ideal.

The "Tree Puzzle" was designed to accomplish the previously mentioned purpose of biology teaching, and I have been encouraged enough by its use to continue. Although the "Tree Puzzle" has its greatest value in the field, it can be used indoors with collected leaf material, with an occasional "lift" by the teacher, and thus it provides a means to the desired end.

Once we arouse an interest in the out-of-door life the student is motivated to study and discover. During the early high school period the student is really a puzzle even unto himself, and interested in the facts of life of all kinds. We as teachers should not allow this period of life to slip from us without establishing a good basis for the building of satisfactory character traits.

The "Tree Puzzle" teaches the student to observe and make correct observations. Most everyone likes a puzzle, and high school students like to compete in games to see who can be the winner. We might compare the "Tree Puzzle" to a multiple choice test. Although the multiple choice test does not teach as much as the essay type test, it is a good device for teaching for it exercises the powers of recall of basic information, and develops the powers of discrimination. However, in the multiple choice test one does not have to establish the absolute truth, while with the puzzle idea of looking up plants some basic learning is necessary as to leaf characteristics, and finally the alternative chosen must be correct. We therefore find that the "Tree Puzzle" that I have been using, surely exercises the power of recall, which is one of the best aids to memory. It also develops and demands more intensive powers of discrimination, for accurate discrimination is necessary to solve any puzzle worth solving. The "Tree Puzzle" or any "key" method is therefore a better teaching device than a multiple choice test, for in addition to exercising recall and discrimination the absolute truth must be established when considering the numerous groups of alternative lines, or one is on the wrong track. If the student

is on the wrong track he will usually discover the error himself and make the correction by a little back tracking. Such a method of study and learning should contribute to the formation of good study habits.

Many people never develop good study habits by their home training, hence if the school can develop and employ such devices as the puzzle idea, it is, in my opinion, well worth the effort. However, the idea is not at all original with me, but I believe it needs new emphasis.

When introducing the use of the "Tree Puzzle" I usually precede the out-of-door trips with a few exercises on leaves, encouraging the student to use the fly-sheet of the booklet in answering the questions on leaf characteristics. After about three laboratory periods on leaves we venture out of doors. However, I have taken students outside with only a brief persual of the fly-sheet of leaf characteristics and had what I would judge good results, for the student will quickly learn the necessary parts of the leaves demanding consideration by working with them.

As I mentioned before the initial employment of the "Tree Puzzle" should be no more difficult than the possibility of accomplishment, therefore we begin with some easy tree like the elm and maple. I desire to work along with the students until each one grasps the idea of how the puzzle works. When field acquaintance has been made with the simple and compound leaves, also the fly-sheet and glossary, I assign a tree for solution by the puzzle method without my assistance.

When the student thinks he has solved the problem by the puzzle method, he is asked not to speak the name of the tree when reporting for verification, but only to point to the common name. This avoids confusing the other students still at the task. However, I have observed a system of signals in operation regardless of the size of the group at the tree. If the student reports correctly, I indicate approval and point out the next tree. If not correct, a request to try again is voiced. If the task appears too difficult for about two or three students, the majority being busy on the second tree, I take the time to analyze the difficulty and assist in the correct solution.

However, after the students have tried about five trees by themselves most of the difficulties are over and the greater share of the class make worthwhile progress during the field trips.

In case of absence the problem is not difficult, for the student missing the field trip can be asked to look up a certain number of

trees, bringing leaves of each for verification, but specifying no duplication of previously studied trees.

Each student in the class is requested to write a most descriptive phrase of each tree studied, using one of the pages marked "notes" in the back of the booklet. Each student is required to write a more detailed description in his laboratory book after the return to the class-room.

No doubt the "Tree Puzzle" may possess some imperfections — however, it is the result of my attempt to teach high school students and assist others to teach, a greater appreciation of nature.

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